

Renewable Energy and Its Impacts on Sustainable Development in Algeria**HABILI Hayet**MCA Tipaza University (Algeria), habihayet@gmail.com**Received:** 28/09/2025**Accepted:** 02/11/2025**Published:** 25/11/2025**Abstract:**

Economic growth has traditionally relied on increased energy use from fossil fuels, leading to higher greenhouse gas emissions. This has driven the shift toward renewable energy to reduce emissions and support cleaner alternatives. Renewable technologies now play a key role in meeting energy demands while supporting environmental goals. Implementing renewables requires considering global, regional, and local factors and setting clear priorities. This approach helps create the right conditions to advance sustainable development goals, particularly by promoting clean, secure energy and mitigating climate change. This study explores how renewable energy improves efficiency and accelerates progress toward sustainability.

Keywords: Renewable energy, sustainable development, Economic development.**JEL Classification:** Q3 ,Q1, O1

1. Introduction:

Using renewable energy has become a major global issue as a way to meet the rising demand for energy. It is well known that the availability of reliable energy sources is the main factor that drives development. This fact has brought to light an important aspect, especially since conventional energy sources are expected to run out in the next few years. This depletion has led to a steady rise in prices in the global energy market, as well as a greater need for energy from traditional sources. These changes have hurt the climate, especially in big cities where energy use is highest, where pollution and greenhouse gas emissions have been rising quickly around the world.

Providing energy is very hard on both the economy and the environment. In developed countries, buildings use a lot of the country's energy budgets to meet basic needs like heating, cooking, lighting, and other daily needs. On the other hand, buildings in developing countries often use more energy than buildings in developed countries. In this situation, we need to look for renewable energy sources that are good for the environment and can help national economies have a better future. These sources should also fit with the goals of the sustainable development agenda.

In Algeria, the government is very interested in developing renewable energy sources because they want to replace fossil fuels in many areas. The plans and strategies set out in this framework are meant to help this effort reach certain goals, the most important of which are becoming energy independent from oil and meeting the requirements for sustainable development. The government started a big program in 2011 to create renewable energies and make energy use more efficient. This was done by creating the right laws and regulations.

Based on the foregoing, the central issue of this research focuses on the importance of exploiting renewable energies and their role in achieving sustainable development in Algeria. This gives rise to the primary research question:

To what extent does the utilization of renewable energy contribute to fulfilling the requirements of sustainable development in Algeria within the framework of the renewable energy and energy efficiency program?

Study Hypotheses

To answer the main research question, we suggest the following hypotheses:

- Renewable energy is sustainable, and using it is in line with the principles and requirements of sustainable development.
- To meet the goals and needs of sustainable development, we need to use new energy sources that don't harm the environment, protect ecosystems, and help with overall economic and social growth.

- ## Study Objectives

Study Structure

2. Renewable Energy (Concept and Sources)

2.1 The Concept of Renewable Energy

Environmental issues have gone from being problems that only affected one country to problems that affect all countries and make them less stable. As a result, environmental factors have become as important as human rights, sustainable development, and fighting terrorism on a global scale. These issues have become very important on the international agenda, leading to coordinated efforts to find new ways to use renewable energy to lessen the negative effects of environmental hazards.

To help the world move toward low-carbon, renewable, and environmentally friendly energy sources like solar, wind, hydropower, biomass, and geothermal energy, we have made progress in technological innovation and energy efficiency. International cooperation has been very important in making decisions about energy policies around the world. More and more people are interested in and competing to invest a lot of money in **2.2 Second**

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Renewable energy comes from sources that never run out and can be quickly replaced. These are harnessed by using common natural events like wind and water power or energy from space bodies like solar radiation (Ibrahim,H., 2018 p. 226). Traditional energy sources can't help us reach sustainable development because they don't protect the environment or make sure that resources are fairly distributed to protect the rights of future generations. To deal with these problems, we need to switch to alternative energy sources—ones that are always available and come back on their own in a natural and cyclical way (Ahmed, 2020, p. 429). Because it is so important for making daily life easier, renewable energy is a key part of advanced societies.

Unlike non-renewable energy sources, which are mostly found as limited reserves underground and need people to get them out, renewable energies grow back faster than they are used up. Biomass, solar, wind, hydroelectric, and geothermal energy are the five main types (El Khayyat, 2017, p. 123).

2.2 Historical Development of Energy Sources

Historical evidence shows that people have used different ways to get energy sources, and these sources have changed in ways that have never happened before as people have developed. In the past, people mostly relied on muscle power(Ibrahim ,A, 2007.224)animal labor, and natural sources like sunlight, wind, and flowing water to meet their basic needs, such as cooking, heating, and milling grain.

As economies grew, the need for energy grew a lot and became more complicated, making it impossible for primary sources to meet the need. The Industrial Revolution in Europe changed the way people used energy in a big way. This was because mechanical machines became more common and there was a greater need for fuel to power them. There was a different change in the main sources of energy during each stage of development. After coal became widely used during the Industrial Revolution, a number of problems arose, such as negative effects on people's health and the environment, high extraction costs, a lot of labor needed, and problems with getting coal to places where it was needed.

As a result, fossil fuels like oil and natural gas became the main sources of energy in industrial economies and the main drivers of growth in developing economies in the twentieth century. The rise in global energy use from oil was helped by its role as a raw material in many chemical industries, its high combustion efficiency, and its low cost compared to other goods (Agency, 2010, p. 29).

In 1973, though, early signs of an impending global energy crisis appeared, and they had major political and economic effects that upset the whole international system. People were worried that oil supplies might run out, which could have bad effects because consumption rates were rising while reserves were low.

So, the twenty-first century has seen the start of a big shift away from fossil fuels and toward renewable energy sources that will never run out. There are many reasons for this change, including protecting the environment, worries about climate change and global warming, limited supplies, pricing problems, and new technologies. In the end, society should switch to renewable energy for both economic and environmental reasons (Al-Sayyid & Al-Saud, 2007, p. 120).

2.3 Energy Sources

Energy sources are broadly categorized into two main types:

2.3.1 Conventional Energy Sources

These include fossil fuels like coal, oil, and natural gas in all their forms. Over millions of years, these resources formed inside the Earth. They are very important because they can store chemical energy that can be easily released as heat during combustion. Oil makes up about 36% of the world's energy use, and natural gas makes up about 24% of the total energy produced (El Fiqi, n.d). Nuclear energy is also used, mostly to make electricity and for some medical treatments. Nuclear reactors have been used to power ships and submarines by using the heat that comes from nuclear fission. But all of these traditional energy sources are limited in quantity and use, and they pollute the environment.

2.3.2 Renewable Energy Sources

These sources are naturally and constantly refilled, and using them doesn't pollute the environment. There are two main types of renewable energy sources:

- Current renewable energy sources with proven technical and economic viability make up the first category. This comprises hydropower, geothermal energy, wind energy, and solar energy, which is the main energy source on Earth.
- The second group includes renewable energy sources like wave, tidal, and hydrogen energy that are still in the experimental and research stages.

This study will focus on renewable energy sources currently in use, detailed as follows:

- One of the most plentiful natural resources, solar energy can be used for a variety of purposes, such as heating, lighting, water heating, and thermal processes to generate electricity. Solar energy is supplied by two main systems:
 - The idea behind photovoltaic (PV) systems is to turn sunlight, either direct or diffused, into electrical energy. This kind of energy can be incorporated into the grid for larger power plants and is especially appropriate for rural and isolated locations (Amina, 2012, p25)
 - Solar Thermal Turbine Systems: These devices direct sunlight onto a tube or reservoir that holds a saline solution. The solution vaporizes and produces steam when heated to extremely high temperatures, which powers a turbine to

generate electricity. It is also possible to heat using the thermal energy from the steam or heated fluid.

air conditioning or water. Even though these industries have grown quickly—photovoltaic solar energy has grown at an annual rate of 46.2% and solar thermal energy has grown at an annual rate of 11.7% between 1990 and 2015—solar energy's share of the world's total renewable energy share is still quite small, at no more than 2.5% (Hadda,2012,p12)

- Hydroelectric power, one of the oldest energy sources used for a variety of purposes around the world, has recently been used to generate electricity. In order to achieve this, dams and artificial reservoirs are built alongside power plants situated at watercourses to guarantee a steady supply of water for the effective operation of these plants. The largest source of energy in the world is hydropower, which in 2015 produced about 16.4% of the world's electricity. With roughly 26.7% of the global output, China leads the world in the production of electricity from this source.
- Humans have long used wind energy, particularly for sailing ships and other forms of transportation. As society has developed and its needs have changed, wind energy harvesting techniques have expanded to include the production of electricity. The development of technologies to harness wind energy for power generation has been the subject of numerous studies and research initiatives. Since the ability of wind to generate electricity is directly proportional to the cube of wind speed, even small changes in wind speed can have a big impact on the amount of electricity produced. As a result, choosing appropriate locations for wind power plants—which can be onshore or close to coastlines—requires careful consideration. With an average annual growth rate of 20%, the capacity of wind energy production worldwide grew from 93,000 megawatts in 2007 to 466,000 megawatts in 2016 (Hariz,2014,p231)
- Organic materials originating from plants or animals make up biomass energy. Biofuel, which is made from specific agricultural products like corn, wheat, sugarcane, and beetroot, is one of its important sources. As is the case in nations like the US and Brazil, biofuel is blended with gasoline and then used as a vehicle fuel. Furthermore, oilseed crops like sunflower, soybean, palm, and others are used to make biodiesel. In 2015, the International Energy Agency estimated that 10.3% of the world's energy came from biomass.

It is crucial to remember that the high expenses associated with producing this kind of fuel frequently outweigh the expected benefits. Additionally, the loss of agricultural food supplies is a component of the opportunity cost, which is especially significant for developing nations (Halem,2014,p521)

- Geothermal energy is the thermal energy found in hot rock, steam, and water reservoirs that are deep within the Earth. At the moment, hot water and steam are the

main methods used to harness heat for the production of electricity or for medical and tourism purposes, while the potential of hot rocks is still being investigated. Among the top users of geothermal energy are nations like Iceland, Kenya, the Philippines, and Nicaragua. Between 1990 and 2017, this energy source grew at an annual rate of about 1.4% (Saleh,2002,331)

- The majority of nuclear power plants built in the 1970s, mainly in reaction to the oil price crisis, are where nuclear energy first appeared. The typical operating lifespan of these plants is between 30 and 40 years. Nuclear energy's growing use has produced waste that needs safe storage facilities. As a result, significant issues surrounding the decommissioning of aging reactors surfaced in the 1990s. Some proponents are in favor of the development of new-generation nuclear reactors (Generation IV), which are expected to generate less waste, despite worries about the effects of climate change.

Approximately 14% of the world's electricity and 6% of global energy consumption are currently provided by nuclear energy (Saddam,2013,p222) Since there are currently no operational examples of Generation IV reactors, it is impossible to determine the true costs of these reactors from an economic standpoint. This ambiguity results from the fundamental differences between nuclear energy and renewable energy sources. The risks of unplanned accidents releasing radiation and the ongoing difficulties with long-term storage of nuclear waste are major factors affecting nuclear energy's economic feasibility. These elements make it more difficult to calculate the financial costs involved, which has raised calls for governments all over the world to reevaluate their nuclear energy initiatives.

2.4 Advantages of Renewable Energy

Numerous benefits that are advantageous to both people and the environment define renewable energy. The following are some of the most important advantages (Mohamed, 2017, p. 249):

- It is sustainable and limitless, always present on Earth, and offers a plentiful supply of energy that is currently used by about 2.1 million people worldwide.
- It is environmentally benign because it doesn't generate any waste that could jeopardize the wellbeing of living things. By creating associated projects, its implementation is anticipated to lower carbon dioxide emissions by about 225.7 thousand tons.
- Because it doesn't catch fire, it is safe for people. The transition to its use helps to get rid of dangerous materials that need expensive upkeep and safety precautions. Reducing costs through efficient consumption and creating revenue-generating jobs in installation and maintenance—an estimated 3.3 million jobs total—both directly and indirectly through project execution.

- Promotes self-sufficiency and lowers energy imports, which boosts the national economy. Reducing fuel imports is expected to save about 38 million liters of heavy fuel oil and diesel annually, as well as reduce costs by about 32.6 million USD. Furthermore, it saves about 220 million liters of water annually that are used for household and commercial uses. About 1.9 million institutions, healthcare facilities, and small and medium-sized businesses will experience additional economic and social advantages as a result of having access to electricity for productive purposes.

2.5 Challenges Facing the Growth of Renewable Energies

The expansion of renewable energy faces a set of obstacles that limit its widespread adoption, which can be classified as follows (Ibrahim, 2018, p. 21).

- Political and legal barriers, such as the lack of clear laws and policies and the lack of clear ways to encourage investment in sectors that help renewable energy grow and spread. Also, the government agencies, executive bodies, financial institutions, suppliers, and end-users that need to work together don't do so very well.
- Legal problems that come up because of differences in systems and rules between countries that make it harder to get permits and take longer to get approvals, which makes investing in renewable energies less appealing.
- Weather Problems: Things like dust, particles in the air, cloud cover, lack of water, and changing wind conditions often make it hard for renewable energy sources to make electricity. These problems make it less appealing to invest in and support these sectors, and they also make people look for other high-efficiency technologies that can work well in changing weather conditions that hurt their performance and productivity.
- Technological and Technical Barriers: To make the equipment needed for renewable energy technologies, you need to have a lot of technical knowledge and experience. You also need to be able to work within a technological framework that is specific to the environmental conditions of each country. Also, advanced countries are often hesitant to share these technologies with developing countries, which makes it even harder for renewable energy applications to spread and be used.
- Economic Barriers: These are clear in the difference between the cost of producing energy and the average market price for it. This is mostly because there aren't enough financial incentives and support to encourage the widespread use of renewable technologies.

2.6 Investment and Production Costs of Renewable Energies

To figure out how important and economically viable renewable energies are, especially for making electricity, we need to look at the costs of building power plants and getting the right licenses.

With an investment return rate of at least 3% and at most 10%, it is clear that gas-fired power plants have the lowest investment costs compared to other types of plants. At a 3% return rate, the cost is about \$521 per kilowatt (kW) of installed capacity. If the return rate goes up to 10%, the cost of building and running the plant goes up to about \$1,420 per kW. The lowest cost for a hydropower plant is \$664 per kW at a 3% return rate, and the highest cost is \$12,348 per kW at a 10% return rate.

Other types of renewable energy have different investment costs. For example, wind power plants can cost up to \$3,146 per kW at a 10% return rate, while photovoltaic (solar) plants can cost around \$2,688 per kW at the same return rate. There are a number of reasons why investment costs vary. The most important ones are the plant's operational lifespan, the type of technology used, the internal rate of return on investment, local market conditions and requirements, and the situation in each country.

3. Renewable Energy as an Approach to Achieving Sustainable Development

The United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in 2012 brought a lot of attention to protecting the environment around the world. A number of papers came out of this conference that focused on the idea of sustainable development. Sustainable development tries to find a balance between the needs of different types of development and the need to protect natural resources and wealth. It is based on a set of rules, the most important of which are:

The Precautionary Principle means planning and looking ahead—either fully or partially—based on scientific data to avoid harm;

The Principle of Participation means that everyone who has a stake in environmental management and protection should be involved, including central and local government, civil society, and the private sector;

The Principle of Integration means that environmental factors should be taken into account when making plans for economic and social development. This integration aims to cut down on pollution in a way that is in line with the goals of sustainable development. It will make sure that development activities can continue without harming the environment. People know that environmental damage goes beyond political and natural borders between countries.

3.1 The Concept of Sustainable Development

A lot of people around the world are interested in the idea of sustainable development. This is mainly because it tries to meet the needs of the current generation for environmental resources without making it harder for future generations to meet their own needs (Mohamed, 2007: 17). To make the economic and social progress we want, we need to protect our natural resources while we use them. If we don't, they will run out or become less useful, which will cause serious problems.

There are four parts to sustainable development: economic, social, environmental, and technological (Mohamed, 2002: 94). For developed countries, sustainable development means using fewer resources and energy. For developing countries, it means using resources to raise living standards and fight poverty. It wants to slow down population growth and improve health and education services, especially in rural areas, in a way that is good for people and society. It means protecting natural resources and making the best use of farmland and water resources. In terms of technology, it wants to move society toward clean industries that use technologies that are good for the environment.(Wahid,al Hawdia)

Development must not destroy or use up natural resources, and it must also involve a technological change in the current industrial and technological base (Ramadan, 2007: 17). It is interesting to note that Islamic law has many rules that directly and indirectly reflect the ideas of sustainability in many areas. These are shown by rules against being wasteful and extravagant, which tell people to only eat what they need and what those they support need, without going overboard (Al-Faqi, 2008: 9).

3.2 Renewable Energy within the Dimensions of Sustainable Development

Renewable energy is an important part of the goals and plans for sustainable development because it helps the economy, society, and the environment.

3.2.1 Economic Dimension

The role of renewable energy in this dimension is reflected in the following aspects (Yousef, 2020, p. 429):

- Changing how people make and use things by putting in place policies that make it easier for people to use energy-efficient and long-lasting technologies, along with pricing systems that give people the right incentives to use less energy.
- Diversifying energy sources and slowly improving their uses to cut down on the use of traditional energy sources, which will allow for the export of extra energy and the extension of oil and gas reserves' lives.
- Creating good jobs that pay well by encouraging production sectors that don't pollute and setting up jobs in activities that are good for the environment.
- Building and developing renewable energy plants in their many forms lowers the costs of connecting to the national grid and lowers the costs of building and maintaining these plants compared to traditional power plants. This creates more value and diversifies the country's sources of income.

3.2.2 Environmental Dimension

The use of renewable energy contributes to the environmental aspect through the following (Maddahi, 2012, p. 73):

- Emissions of pollutants from renewable energy sources are minimal, resulting in a low carbon footprint.

- Cutting down on health problems and neurological disorders caused by gases and pollutants that come from burning fossil fuels
- As technology improves over time, the costs of production and installation go down. This means that less waste goes to landfills and less carbon is released into the air.

3.2.3 Social Dimension

Renewable energy can fulfill its social objectives as follows:

- Making sure that people always have access to safe and reliable energy sources will help improve human development indicators.
- Renewable energy sources are local and work well for the needs of rural and remote areas. They meet the development needs of these areas and help to reduce spatial disparities.
- Access to affordable, sustainable energy sources that fit their budgets can boost economic activity and improve living conditions, especially for people living in rural areas. This helps keep people in their homes and reduces migration.

4. The Role of Renewable Energy in Achieving Sustainable Development in Algeria

Algeria has a lot of potential in the area of renewable energy, especially solar energy. Renewable energy is seen as a key driver of long-term economic growth, and it will be a major focus of national energy and economic policies until 2030. Photovoltaic and solar thermal energy are expected to meet about 40% of energy needs.

4.1 Legal and Legislative Framework for Renewable Energies in Algeria

The Algerian government understands that renewable energy is becoming more important and difficult to deal with, so it has made its development a part of national energy policy by creating a legal framework that encourages its growth and the creation of institutional structures in this area. Several legal texts related to sustainable development support the growth of renewable energies. These include:

- (Law No. 99-09, 1999), deals with managing energy: This law includes all the steps that need to be taken to use and develop renewable energy sources and lessen the negative effects on the environment that come from using traditional energy sources. It aims to steer energy demand toward higher efficiency within the framework of national energy use.
- (Executive Decree No. 03-10, 2003), talks about protecting the environment as part of sustainable development. This decree has more than 114 articles that deal with protecting the environment and punishing those who break the rules, like polluting the air and sea with oil waste and harming biodiversity.
- (Executive Decree No. 04-149, 2004), lays out how to make a national energy management program: This order's goal is to evaluate abilities and set energy management goals through activities that will help reach the following goals:

- Achieving energy consumption savings;
- Ensuring energy substitution and the development of renewable energies.
- (Law No. 04-09, 2004), is about renewable energies and sustainable development. This law encourages the use of renewable energy sources to reach the following goals:
 - Environmental protection and reduction of greenhouse gas emissions responsible for climate change;
 - Contribution to sustainable development through the preservation of available resources;
 - Incorporation of renewable energy's share and applications within the national energy policy.

4.2 Developmental Dimensions of the Renewable Energy and Energy Efficiency Program

Algeria's Renewable Energy and Energy Efficiency Program, which was put into place in 2011, shows that there are several ways to reach sustainable development, such as:

4.2.1 Economic Dimensions

- Promoting a new growth model based on renewable energies that drives economic and social development;
- Effectively controlling the growth rate of energy demand by combining energy efficiency measures to manage resources and set up necessary and optimal consumption;
- Meeting the country's long-term energy needs and making big cuts in the use of fossil fuels;
- Protecting fossil energy resources, making electricity production more diverse, and helping with sustainable development;
- Putting more money into renewable energy technologies will boost the economy and create new jobs, especially in local businesses that make renewable energy products.

4.2.2 Social Dimensions:

- Improving the standard of living by fulfilling energy demands, especially in isolated areas, thereby reducing rural-to-urban migration;
- Generating direct and indirect employment opportunities through renewable energy projects;
- Reducing poverty by making sure that people in remote desert areas have access to energy, which in turn creates new jobs and makes social services better in these areas.

4.2.3 Environmental Dimensions

- Reducing greenhouse gas emissions, thus contributing to combating global warming and preserving the environment;

- Using renewable energy technologies to cut down on the pollution caused by making electricity or heat from fossil fuels.

4.2.4 Technological Dimensions

- Increasing research and development activities by using cleaner technologies and more sustainable methods;
- Getting private sector organizations to work with government agencies on different projects, especially those that use advanced tech Bringing together knowledge and creating training programs to make the most of Algerian skills while improving science, technology, and innovation to raise scientific and intellectual standards.

4.3 Future Prospects for Renewable Energy in Algeria

Because of its natural resources and skills, Algeria is expected to become a global economic power in renewable energy by 2030. This will make the country less reliant on the hydrocarbon sector for its economy. During this time, Algeria's energy profile is expected to reach a positive peak. By 2030, renewable energy sources are expected to meet 37% of the country's energy needs (Renewable Energies and Their Role, 2020: 12).

By 2030, renewable energy could make up as much as 40% of Algeria's total energy mix. Concentrated solar power would make up 60% of this share, photovoltaic solar energy (which turns sunlight into electricity) would make up 23%, and wind energy and other technologies would make up 17%. The cost of making electricity from photovoltaic cells is expected to be between 70 and 325 USD per megawatt-hour in 2030. For natural gas and coal, the cost is expected to be between 35 and 45 USD per megawatt-hour in the same year. Also, the price of concentrated solar power is likely to go down compared to photovoltaic solar energy.

Experts say that using Algeria's wind resources could bring in a lot of money—up to 3 billion euros a year—because wind energy is the second most important renewable source after solar energy. This would let Algeria make electricity that helps the environment and creates thousands of jobs, both directly and indirectly.

Official sources say that Algeria is getting ready to start a big wind power generation program that will last for the next nineteen years. The Ministry of Energy and Mines recently reported that the program will cost about 4,500 billion Algerian dinars (about 62 billion USD) to build industrial units and specialized wind farms in places like Dali Ibrahim, Ras El Oued, Bejaia, Setif, Bordj Bou Arreridj, and Tiaret. This promising plan aims to make wind energy widely available by 2030 in all places with a lot of wind, especially in the High Plateaus and the Sahara, with a focus on the wilayas of Tindouf, Timimoun, and Bechar.

Algeria starts a "green energy dynamic" by launching an ambitious program to develop renewable energies (ENR) and improve energy efficiency. This program is based on a

strategy that focuses on using inexhaustible energy sources to diversify the country's energy supply and shape its future. So, about four years after the start of the renewable energy and energy efficiency nologies; development program, Algeria enters a new era of sustainable energy, both at home and abroad. Some of the most important results of this first phase are:

- More knowledge about the country's renewable energy resources, especially solar and wind energy, thanks to in-depth research done during this time.
- The costs of making solar cells and wind energy equipment are going down. These industries are becoming more established as sustainable and economically viable, thanks to technological maturity and competitive prices.
- The costs of making solar technology are still high because the technologies are still new, especially when it comes to energy storage, and the market is growing very slowly.

The new renewable energy program's goal is to create a renewable capacity of 22,000 MW by 2030 for the national market. The program also wants to keep the strategic goal of exporting energy if market conditions allow it. This new program puts renewable energy and energy efficiency at the center of Algeria's economic and energy policies. By 2030, it is expected that 37% of installed capacity and 27% of electricity used in homes will come from renewable sources.

Algeria's renewable energy program aims to make the country a major player in energy production by using solar and wind power, as well as biomass, cogeneration, and geothermal energy. These energy sectors will drive sustainable economic growth and create a new way for the economy to grow.

Algeria's renewable energy sources are mostly solar, so the country sees solar energy as both an opportunity and a way to improve the economy and society, especially by creating industries that create jobs and wealth. At the same time, the program plans to start several projects to create wind energy zones and use biomass, geothermal, and cogeneration energy. As part of the renewable energy program, about sixty solar power plants and wind farms will be built by 2020. There will be two phases of projects to make renewable electricity for the national market:

- Phase One (2015–2020): In this phase, the goal is to install 4,000 MW of renewable energy capacity, split between solar and wind energy, as well as 500 MW from biomass, combined heat and power (CHP), and geothermal sources.
- Phase Two (2021–2030): Building electrical connections between northern areas and the Sahara (Adrar) will make it possible to build large-scale renewable energy plants in places like Ain Salah, Adrar, Timimoun, and Béchar and connect them to the national energy system. At this point, solar thermal energy should be able to make money.

By 2020, the amount of electricity made is expected to reach 90 terawatt-hours (TWh), and by 2030, it is expected to reach 170 TWh. So, adding renewable energy to the energy mix is a very important strategic goal for protecting fossil fuel resources, increasing the number of energy production sources, and helping to make development more sustainable. These factors make it necessary to include renewable energies in the long-term energy supply strategy, while also stressing how important it is to use energy efficiently.

Algeria has started down the path of using renewable energy sources to solve environmental problems in a way that is long-lasting and doesn't use up fossil fuels. The program includes a lot of work on solar photovoltaic and wind energy. The introduction of solar thermal energy, biomass, combined heat and power, and geothermal energy will happen slowly and will be based on the needs of each area:

- In the Sahara region, the focus will be on combining existing diesel-powered plants and supplying remote areas, since the region has a lot of solar and wind potential.
- In the High Plateaus region, where there is a lot of sunlight and wind and land is available, development will be done in a way that makes sense.
- In the coastal region, development will depend on how much land is available and will focus on making the most of areas that have a lot of renewable energy potential.

The Algerian Renewable Energy Program's goal is to make 22,000 megawatts (MW) of electricity by 2030. Of this, 12,000 MW will be used to meet domestic demand and 10,000 MW will be exported. Experts agree that Algeria can produce about 170 terawatt-hours of renewable energy, making it the best Mediterranean country in this field.

Accordingly, the realization of this program will enable:

- Achieving a renewable energy share of 27% of the national electricity production portfolio by 2030.
- Saving 300 billion cubic meters of natural gas, equivalent to eight times the national consumption of 2014.

Along with a network of research and development facilities, such as the Renewable Energy Development Center, the National Agency for the Promotion and Rationalization of Energy Use, the Electricity and Gas Research and Development Center, and the Solar Energy Equipment Development Unit, the Algerian government established the Algerian Institute for Research and Development of Renewable Energies to support this endeavor.

4. CONCLUSION

The sustainability of renewable energy sources holds great importance in the field of sustainable development, as the production and consumption of energy can affect the future of many generations to come due to escalating risks and problems, especially the issue of environmental changes. Therefore, there has become a real necessity and need to move towards the development and exploitation of renewable energy sources globally, and to

encourage and facilitate promising initiatives, especially in the solar and wind energy sectors.

Through what has been presented in the research, we have reached the following results and recommendations:

- There is a strong correlation between energy and the achievement of sustainable development requirements, which necessitates attention to environmental protection in order to achieve them. Renewable energy constitutes one of the important means for this purpose, as it is a non-polluting energy source that preserves the environment.
 - The renewable energy and energy efficiency program is an ambitious and purposeful program aimed at achieving comprehensive sustainable development at the national level, particularly in breaking the isolation of remote areas. However, the desired effects from it will appear in the medium and long term.
 - The growing importance of renewable energies on one hand, and the significant potential that Algeria possesses on the other, have pushed it to include them in its energy policy through launching a significant program to that end, along with a set of laws that encourage its promotion and the establishment of infrastructures in this field. The implementation of program projects must be accelerated within the scheduled deadlines.
 - Consolidating and supporting the orientation towards the use of renewable and alternative energies in national strategies due to their distinctive advantages.
 - Establishing a sound legislative framework and strict procedures to support renewable energy programs so that they can be completed on time.
 - Encouraging cooperation with developed countries in the field to benefit from their expertise.
 - Supporting this type of project by the state through financial or tax incentives that strongly support the success of these projects.
- a major program and the passing of laws that promote its growth and the creation of institutional frameworks in this area. It is very important to speed up the completion of the program's projects within the set time frames.

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